CLAIMS

1. A control apparatus for an internal combustion engine which generates power by burning a mixture of fuel and air in a cylinder thereof, comprising:

in-cylinder pressure detecting means;

calculating means to calculate a control parameter based upon the in-cylinder pressure detected by the in-cylinder pressure detecting means and an in-cylinder volume at timing of detecting the in-cylinder pressure; and

intake air quantity calculating means to calculate a quantity of air aspirated into the cylinder based upon the control parameters calculated at at least two points during an intake stroke by the calculating means.

2. The control apparatus for the internal combustion engine according to claim 1, wherein:

the control parameter includes a product of the in-cylinder pressure detected by the in-cylinder pressure detecting means and a value obtained by exponentiating the in-cylinder volume at the timing of detecting the in-cylinder pressure with a predetermined index.

3. The control apparatus for the internal combustion engine according to claim 2, wherein:

the intake air quantity calculating means calculates

the quantity of the air aspirated into the cylinder based upon a difference in the control parameter between the two points.

5   4. The control apparatus for the internal combustion engine according to claim 3, wherein:

the intake air quantity calculating means calculates the quantity of the air aspirated into the cylinder based upon the difference in the control parameter between the

10   two points and heat energies transmitted to a cylinder wall.

5. The control apparatus for the internal combustion engine according to claim 1, wherein:

15   the two points at which the control parameters are calculated are set in accordance with opening/closing timing of an intake valve.

6. A method of calculating an intake air quantity for

20   an internal combustion engine which generates power by burning a mixture of fuel and air in a cylinder, comprising the steps of:

(a) detecting an in-cylinder pressure;

(b) calculating a control parameter based upon the

25   in-cylinder pressure detected in the step (a) and an in-cylinder volume at timing of detecting the in-cylinder pressure; and

(c) calculating a quantity of air aspirated into the cylinder based upon the control parameters calculated at at least two points during an intake stroke.

5   7. The method of calculating the intake air quantity for

the internal combustion engine according to claim 6, wherein:

the control parameter includes a product of the
10   in-cylinder pressure detected in the step (a) and a value obtained by exponentiating the in-cylinder volume at the timing of detecting the in-cylinder pressure with a predetermined index.

15   8. The method of calculating the intake air quantity for the internal combustion engine according to claim 7, wherein:

the step (c) calculates the quantity of the air aspirated into the cylinder based upon a difference in the
20   control parameter between the two points.

9. The method of calculating the intake air quantity for the internal combustion engine according to claim 8, wherein:

25   the step (c) calculates the quantity of the air aspirated into the cylinder based upon the difference in the control parameter between the two points and heat

energies transmitted to a cylinder wall.

10. The method of calculating the intake air quantity for the internal combustion engine according to claim 6, further comprising the step of:

changing the two points at which the control parameters are calculated, in accordance with opening/closing timing of an intake valve.